Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical	**Generating Instrument**		
	DC Resistance		In-house Method: CP-E1045
	0.1 mΩ to 100 mΩ	3.0 μΩ/Ω	by comparison technique
	> 100 mΩ to 100 Ω	1.8 μΩ/Ω	using DCC Resistance Bridge
	> 100 Ω to 100 kΩ	1.0 μΩ/Ω	and Extender (1:1 to 1000:1
	> 100 kΩ to 10 MΩ	1.5 μΩ/Ω	ratio)
	> 10 MΩ to 100 MΩ	5.0 μΩ/Ω	
	> 100 MΩ to 1 GΩ	20 μΩ/Ω	
	>1 MΩ to 100 MΩ	50 μΩ/Ω	In-house Method CP-E1002
	> 100 MΩ to 1 GΩ	0.10 mΩ/Ω	based on Ohm's Law with
	> 1 GΩ to 10 GΩ	0.15 mΩ/Ω	constant current and varied test
	> 10 GΩ to 100 GΩ	0.20 mΩ/Ω	voltage of 10 V to 1kV
	1 mΩ	20 μΩ/Ω	In-house Method CP-E1001
	10 mΩ	10 μΩ/Ω	by comparison to reference
	100 mΩ to 1 Ω	5.0 μΩ/Ω	resistance standard by 1:1
	>1 Ω to 10 Ω	3.5 μΩ/Ω	substitution technique
	>10 Ω to 100 Ω	3.0 μΩ/Ω	
	>100 Ω to 100 kΩ	3.0 μΩ/Ω	In-house Method CP-E1003 by comparison to reference resistance standard by 1:1 substitution technique
	1 mΩ to 10 mΩ	7.0 μΩ/Ω	In-house Method CP-E1004
	100 mΩ	14 μΩ/Ω	by comparison to reference resistance standard by 1:1 substitution technique
	0.1 mΩ to 1 mΩ	85 μΩ/Ω	In-house method: CP-E1014
	>1 mΩ to 10 mΩ	30 μΩ/Ω	by applied current and
	>10 mΩ to 1 kΩ	25 μΩ/Ω	measure voltage across resistance Ohm's law
	0 Ω to 2 Ω	20 μΩ/Ω	In-house method: CP-E1015
	> 2 Ω to 2 MΩ	11 μΩ/Ω	By direct measurement
	> 2 MΩ to 20 MΩ	18 μΩ/Ω	
	> 20 MΩ to 200 MΩ	75 μΩ/Ω	
	> 200 MΩ to 2 GΩ	0.24 mΩ/Ω	
	> 2 GΩ to 20 GΩ	1.2 mΩ/Ω	
	> 20 GΩ to 100 GΩ	7.0 mΩ/Ω	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Generating Instrument** **DC Voltage**		
	10 V	0.50 μV/V	In-house Method CP-E1008 by difference voltage measurement,
	1.018 V	1.0 μV/V	comparison to reference
	1V	1.1 μV/V	voltage standards
	10 V, 100 V, 1000 V	1.0 μV/V	In-house Method CP-E1010 by direct measurement, comparison
	0 mV to 10 mV	0.5 μV	
	> 10 mV to 100 mV	0.50 μV or 3.0 μV/V*	to reference voltage standards
	>100 mV to 1050 V	2.0 μV/V	*whichever is greater
	1 kV to 10 kV	0.15 mV/V	In-house Method CP-E1037 using high voltage divider
	0 mV to 200 mV	6.0 μV/V	In-house Method CP-E1032
	>200 mV to 2 V	4.0 μV/V	by direct measurement using
	>2 V to 20 V	4.0 μV/V	dc voltage standards
	>20 V to 200 V	5.0 μV/V	
	>200 V to 1050 V	6.0 μV/V	
	DC Current		In-house Method CP-E1012
	1 nA to <10 nA	0.20 mA/A	by direct measurement at
	> 10 nA to <100 nA	0.10 mA/A	1nA to 1 μA and measurement
	> 0.1 μA to <1 μA	50 μA/A	voltage across shunt
	1 μA	20 μA/A	(Ohm's Law) at 1 μA to 20 A
	> 1 μA to 2.2 A	10 μA/A	
	> 2.2 A to 20 A	20 μA/A	
	0 mA to 200 mA	20 μA/A	In-house Method CP-E1036
	> 200 mA to 2 A	70 μA/A	by direct measurement or
	> 2 A to 20 A	0.10 mA/A	substitution method
	Generating instrument **AC voltage**		In-house method: CP-E1027
	@ 10 Hz to 10 kHz		by direct measuring using
	1 mV to 2 mV	1.0 μV/V	AC-DC thermal transfer
	> 2 mV to 20 mV	1.0 μV or 70 μV/V*	standard
	> 20 mV to 200 mV	70 μV/V	* whichever is greater
	@ 10 Hz to 10 kHz		In-house method: CP-E1021
	1 mV to 2 mV	1.1 μV/V	by direct measuring using
	> 2 mV to 20 mV	1.8 μV or 0.13 mV/V*	AC-DC thermal transfer
	> 20 mV to 200 mV	70 μV/V	standard
	@ > 10 kHz to 1 MHz		* whichever is greater
	1 mV to 2 mV	1.3 μV/V	
	> 2 mV to 5 mV	1.5 μV or 0.45 mV/V*	
	@ > 10 kHz to 100 kHz		
	> 5 mV to 20 mV	1.5 μV or 0.10 mV/V*	
	> 20 mV to 200 mV	70 μV/V	
	@ > 100 kHz to 500 kHz		
	> 5 mV to 20 mV	0.26 mV/V	
	> 20 mV to 200 mV	0.16 mV/V	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Generating instrument AC voltage (cont.)**		
	@ > 500 kHz to 1 MHz		
	> 5 mV to 20 mV	0.26 mV/V	
	> 20 mV to 200 mV	0.18 mV/V	
	@ 10 Hz to 500 kHz		
	> 0.20 V to 0.50 V	80 µV/V	
	> 0.50 V to 20 V	70 µV/V	
	@ > 500 kHz to 1 MHz		In-house method: CP-E1021 by direct measuring using AC-DC thermal transfer standard
	> 0.20 V to 0.50 V	0.15 mV/V	
	> 0.50 V to 20 V	0.10 mV/V	
	@ 10 Hz to 300 kHz		
	> 20 V to 30 V	70 µV/V	
	@ 10 Hz to 100 kHz		
	> 30 V to 1 000 V	70 µV/V	
	@ 50 Hz to 60 Hz		In-house method: CP-E1030 by direct measuring using high voltage probe
	> 1 kV to 6.6 kV	0.50 mV/V	
	@ 10 Hz to 10 kHz		In-house method: CP-E1044 by direct measuring using AC voltmeter *whichever is greater
	1 mV to 2 mV	1.1 µV/V	
	@ > 10 kHz to 1 MHz		
	1 mV to 2 mV	1.3 µV/V	
	@ 10 Hz to 10 kHz		
	> 2 mV to 20 mV	1.0 µV or 70 µV/V*	
	@ > 10 kHz to 1 MHz		
	> 2 mV to 5 mV	1.5 µV or 0.45 mV/V*	
	@ > 10 kHz to 100 kHz		
	> 5 mV to 20 mV	1.5 µV or 0.10 mV/V*	
	@ > 100 kHz to 1 MHz		
	> 5 mV to 20 mV V	0.26 mV/	
	@ > 10 Hz to 100 kHz		
	> 20 mV to 200 mV	70 µV/ V	
	@ > 100 kHz to 1 MHz		
	> 20 mV to 500 mV	0.17 mV/V	
	@ 10 Hz to 500 kHz		
	> 0.20 V to 0.50 V	80 µV/V	
	@ 10 Hz to 500 kHz		
	> 0.50 V to 20 V	70 µV/V	
	@ > 500 kHz to 1 MHz		
	> 0.50 V to 20 V	0.10 mV/V	
	@ 10 Hz to 300 kHz		
	> 20 V to 30 V	70 µV/V	
	@ 10 Hz to 100 kHz		
	> 30 V to 1 000 V	70 µV/V	
	AC current		In-house method: CP-E1005 by using AC current shunt standards with thermal voltage converter
	@ 10 Hz to 10 kHz		
	5 mA to 20 A	0.15 mA/A	
	@ 10 Hz to 1 kHz		In-house method: CP-E1058 by using AC resistance standard Ohm's law
	10 µA to 5 mA	0.20 mA/A	
	@ > 1 kHz to 5 kHz		
	10 µA to 5 mA	0.30 mA/A	In-house method: CP-E1018 by direct measurement with AC current meter or substitution technique
	@ > 5 kHz to 10 kHz		
	10 µA to 5 mA	0.50 mA/A	
	@ 10 Hz to 10 kHz		
	5 mA to 20 mA	0.15 mA/A	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Generating instrument**		
	DC power		In-house method: CP-E1025
	1 mW to 20 kW (1 mA x 1 V to 20 A x 1 kV)	40 µW/W + 0.10 µW	by direct measurement with DC voltage and current standards
	Phase		In-house method: CP-E2040
	0 ° to 360 ° 50 mV to 100 V Voltage ratio 1:1		zero balance measurement by phase bridge
	@ 5 Hz to 50 kHz	0.0050 °	
	@ > 50 kHz to 100 kHz	0.020 °	
	Voltage ratio > 1:1 to 1:100		
	@ 5 Hz to 1 kHz	0.005 0 °	
	@ > 1 kHz to 50 kHz	0.010 °	
	@ > 50 kHz to 100 kHz	0.020 °	
	50 mV to 100 V		In-house method: CP-E2037
	Voltage ratio 1:1		by direct measurement or
	@ 5 Hz to 6.25 kHz	0.020 °	transfer measurement
	@ > 6.25 kHz to 50 kHz	0.030 °	
	@ > 50 kHz to 100 kHz	0.040 °	
	Voltage ratio > 1:1 to 1:100		
	@ 5 Hz to 50 kHz	0.030 °	
	@ > 50 kHz to 100 kHz	0.050 °	
	Capacitance		In-house method: CP-E1007
	@ 1 kHz		by comparison using
	1 pF	15 µF/F	transformer arm radio
	10 pF, 100 pF	5.0 µF/F	technique or substitution
	> 1 pF to 1 000 pF	15 µF/F	technique using capacitance
	> 1 nF to 100 nF	25 µF/F	bridge
	> 0.1 µF to 10 µF	60 µF/F	
	@ 1 kHz		In-house method: CP-E1017
	1 pF to < 10 pF	0.15 mF/F	by direct measurement using
	10 pF to 1 µF	0.12 mF/F	capacitance bridge
	1 pF to 20 pF	14 mF/F	In-house method: CP-E1020
	> 20 pF to 100 pF	5.2 mF/F	by direct measurement using
	> 100 pF to 1 nF	3.4 mF/F	LCR meter
	> 1 nF to 50 nF	1.5 mF/F	
	> 50 nF to 10 µF	1.0 mF/F	
	Frequency		
	0.1 Hz to 1 Hz	5.0×10^{-3}	In-house method: CP-E1054
	> 1 Hz to 10 Hz	1.0×10^{-4}	by direct measurement using
	> 10 Hz to 100 Hz	5.0×10^{-6}	frequency counter
	> 100 Hz to 1 kHz	1.0×10^{-7}	
	> 1 kHz to 10 kHz	5.0×10^{-9}	
	> 10 kHz to 100 kHz	2.0×10^{-10}	
	> 100 kHz to 225 MHz	8.5×10^{-11}	
	> 225 MHz to 18 GHz	5.0×10^{-10}	
	100 kHz, 1 MHz, 5 MHz, 10 MHz	1.0×10^{-11}	In-house method: CP-E1053 by comparison technique (Phase difference)

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Generating Instrument**		
	Temperature simulator		EURAMET cg-11 and
	Resistance thermometer		EN 60751
	-200 °C to 850 °C	0.004 0 °C	
	Thermocouple		EURAMET cg-11 and
	Type S		ASTM E 230
	-40 °C to 50 °C	0.32 °C	
	> 50 °C to 1 767 °C	0.20 °C	
	Type R		
	-40 °C to 50 °C	0.32 °C	
	> 50 °C to 1 767 °C	0.20 °C	
	Type K		
	-200 °C to 0 °C	0.10 °C	
	> 0 °C to 1 372 °C	0.050 °C	
	Type J		
	-210 °C to 50 °C	0.090 °C	
	> 0 °C to 1 200 °C	0.050 °C	
	Type T		
	-250 °C to 0 °C	0.25 °C	
	> 0 °C to 400 °C	0.050 °C	
	Type E		
	-250 °C to 0 °C	0.16 °C	
	> 0 °C to 1 000 °C	0.050 °C	
	Type N		EURAMET cg-11 and
	-200 °C to 0 °C	0.12 °C	EN 60751
	> 0 °C to 1 300 °C	0.050 °C	
	Type B		
	0 °C to 150 °C	1.0 °C	
	> 150 °C to 400 °C	0.40 °C	
	> 400 °C to 1 820 °C	0.25 °C	
	Measuring instrument		
	DC resistance		In-house method: CP-E1039
	0.1 mΩ to 1 mΩ	20 μΩ/Ω	by direct measurement
	> 1 mΩ to 100 mΩ	10 μΩ/Ω	based on EURAMET cg-15
	> 100 mΩ to 10 MΩ	5.0 μΩ/Ω	
	> 10 MΩ to 100 MΩ	10 μΩ/Ω	
	> 100 MΩ to 1 GΩ	60 μΩ/Ω	
	DC voltage		In-house method: CP-E1033
	0.1 V	3.0 μV/V	by comparison to DC voltage
	1 V, 10 V, 100 V, 1 000 V	1.5 μV/V	standard
	0 mV to 10 mV	0.50 μV/V	* whichever is greater
	> 10 mV to 100 mV	0.50 μV/V or 3.0 μV/V*	
	> 100 mV to 1.05 kV	2.0 μV/V	
	> 1 kV to 10 kV	0.15 mV/V	In-house method: CP-E1038 by using high voltage divider

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Measuring instrument**		
	DC voltage		In-house method: CP-E1031
	0 mV to 220 mV	6.0 µV/V + 0.15 µV	by direct measurement
	> 220 mV to 2.2 V	2.2 µV/V + 0.15 µV	based on EURAMET cg-15
	> 2.2 V to 22 V	1.8 µV/V + 1.0 µV	
	> 22 V to 220 V	2.7 µV/V + 10 µV	
	> 220 V to 1 050 V	2.7 µV/V + 0.10 mV	
	DC current		In-house method: CP-E1013
	1 nA to 10 nA 0.20 mA/A		by direct measurement
	> 10 nA to 100 nA 0.10 mA/A		current standard flown
	> 0.1 µA to 1 µA 50 µA/A		through standard shunt
	> 1 µA to 2 A 10 µA/A		
	> 2 A to 20 A 20 µA/A		
	> 10 µA to 220 µA	8.0 µA/A + 0.10 nA	In-house method: CP-E1035
	> 220 µA to 2.2 mA	8.0 µA/A + 0.25 nA	by direct measurement
	> 2.2 mA to 22 mA	8.0 µA/A + 2.5 nA	or substitution method
	> 22 mA to 2.2 A	15 µA/A	based on EURAMET cg-15
	> 2.2 A to 11 A	20 µA/A	
	> 11 A to 20 A	60 µA/A	
	AC voltage		In-house method: CP-E1035
	@ 10 Hz to 10 kHz		by direct measurement
	1 mV to 2 mV	1.0 µV/V	or substitution method
	> 2 mV to 200 mV	1.0 µV/V or 75 µV/V*	based on EURAMET cg-15
	@ > 10 kHz to 1 MHz		*whichever is greater
	1 mV to 2 mV	1.3 µV/V	
	> 2 mV to 5 mV	1.5 µV/V or 0.46 mV/V*	
	@> 10 kHz to 100 kHz		In-house method: CP-E1035
	> 5 mV to 20 mV	0.20 mV/V	by direct measurement
	> 20 mV to 200 mV	0.10 mV/V	or substitution method
	@ > 100 kHz to 500 kHz		based on EURAMET cg-15
	> 5 mV to 20 mV V	0.30 mV/	
	> 20 mV to 200 mV	0.20 mV/V	
	@ > 10 Hz to 500 kHz		
	> 0.2 V to 0.5 V	90 µV/V	
	> 0.5 V to 20 V	70 µV/V	
	@ > 500 kHz to 1 MHz		
	> 0.2 V to 0.5 V	0.20 mV/V	
	> 0.5 V to 20 V	0.10 mV/V	
	@ 10 Hz to 300 kHz		
	> 20 V to 30 V	70 µV/V	
	@ 10 Hz to 100 kHz		
	> 30 V to 750 V	70 µV/V	
	@ 10 Hz to 30 kHz		
	> 750 V to 1 kV	70 µV/V	
			In-house method: CP-E1029
	@ 50 Hz to 60 Hz		
	> 1 kV to 6.6 kV	0.50 mV/V	by direct measurement
			high voltage source
	AC current		In-house method: CP-E1019
	@ 10 Hz to 1 kHz		by direct measurement
	10 µA to 5 mA	0.20 mA/A	or substitution method
	@ > 1 kHz to 5 kHz		
	10 µA to 5 mA	0.30 mA/A	
	@ > 5 kHz to 10 kHz		
	10 µA to 5 mA	0.50 mA/A	
	@ 10 Hz to 10 kHz		
	> 5 mA to 20 A	0.15 mA/A	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Measuring instrument** **AC current (Cont)** @ 10 Hz to 10 kHz > 5 mA to 20 A	 0.15 mA/A	 In-house method: CP-E1006 by against AC current standard shunt with thermal voltage converter
	Phase 0 ° to 360 ° Voltage ratio 1:1 @ 5 Hz to 6.25 kHz @ > 6.25 kHz to 50 kHz @ > 50 kHz to 100 kHz Voltage ratio > 1:1 to 1:100 @ 5 Hz to 1 kHz @ > 1 kHz to 6.25 kHz @ > 6.25 kHz to 50 kHz @ > 50 kHz to 100 kHz	 0.020 ° 0.030 ° 0.050 ° 0.025 ° 0.030 ° 0.035 ° 0.065 °	 In-house method: CP-E2038 by direct measurement of phase standards
	DC power (1 mA x 1 V to 20 A x 1 kV) 0 mW to 20 kW	 40 µW/W + 0.10 µW	 In-house method: CP-E1024 by direct measurement of DC power standards
	AC power @ 10 Hz to 1 kHz Power factor = 1 (1 mA x 1 V to 10 A x 1 kV) 1 mW to 10 kW @ 10 Hz to 65 Hz (1 mA x 1 V to 10 A x 1 kV) Power factor ≥ 0.94 to < 1 1 mW to 10 kW Power factor ≥ 0.77 to < 0.94 1 mW to 10 kW Power factor ≥ 0.5 to < 0.77 1 mW to 10 kW @ > 65 Hz to 500 Hz (1 mA x 1 V to 10 A x 1 kV) Power factor ≥ 0.94 to < 1 1 mW to 10 kW Power factor ≥ 0.77 to < 0.94 1 mW to 10 kW Power factor ≥ 0.5 to < 0.77 1 mW to 10 kW @ > 500 Hz to 1 kHz (1 mA x 1 V to 10 A x 1 kV) Power factor ≥ 0.94 to < 1 1 mW to 10 kW Power factor ≥ 0.77 to < 0.94 1 mW to 10 kW Power factor ≥ 0.5 to < 0.77 1 mW to 10 kW	 0.50 mW/W 1.0 mW/W 2.0 mW/W 5.0 mW/W 2.0 mW/W 5.0 mW/W 10 mW/W 5.0 mW/W 10 mW/W 20 mW/W	 In-house method: CP-E1023 by direct measurement of AC voltage, current and phase standards
	Capacitance @ 1 kHz 10 pF to 10 µF	 0.15 mF/F	 In-house method: CP-E1042 by direct measurement of capacitance standards

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Measuring instrument**		
	Frequency		In-house method: CP-E1062 by direct measurement of frequency standards
	0.1 Hz	5.0×10^{-6}	
	> 0.1 Hz to 1 Hz	7.0×10^{-6}	
	> 1 Hz to 10 Hz	3.0×10^{-6}	
	> 10 Hz to 100 Hz	5.0×10^{-8}	
	> 100 Hz to 1 kHz	7.0×10^{-9}	
	> 1 kHz to 10 kHz	5.0×10^{-9}	
	> 10 kHz to 18 GHz	5.0×10^{-10}	
	AC-DC transfer voltage standard		In-house method: CP-E1051 by direct comparison to AC and DC voltage standards
	@ 10 Hz		
	0.25 V to 200 V	75 µV/V	
	@ 20 Hz to 100 kHz		
	0.25 V to 200 V	50 µV/V	
	@ > 100 kHz to 300 kHz		
	0.25 V to 30 V	0.10 mV/V	
	@ > 300 kHz to 500 kHz		
	0.25 V to 20 V	0.15 mV/V	
	@ > 500 kHz to 1 MHz		
	0.25 V to 20 V	0.20 mV/V	
	@ 40 Hz to 30 kHz		
	> 200 V to 1 000 V	75 µV/V	
	Temperature indicator		EURAMET cg-11 and ASTM E 230
	Resistance thermometer		
	-200 °C to 850 °C	0.004 0 °C	
	Thermocouple		
	Type S		
	-40 °C to 50 °C	0.32 °C	
		0.20 °C	
	> 50 °C to 1 767 °C		
	Type R		
	-40 °C to 50 °C	0.32 °C	
	> 50 °C to 1 767 °C	0.20 °C	
	Type K		
	-200 °C to 0 °C	0.10 °C	
	> 0 °C to 1 372 °C	0.050 °C	
	Type J		
	-210 °C to 50 °C	0.090 °C	
	> 0 °C to 1 200 °C	0.050 °C	
	Type T		
	-250 °C to 0 °C	0.25 °C	
	> 0 °C to 400 °C	0.050 °C	
	Type E		
	-250 °C to 0 °C	0.16 °C	
	> 0 °C to 1 000 °C	0.050 °C	
	Type N		
	-200 °C to 0 °C	0.12 °C	
	> 0 °C to 1 300 °C	0.050 °C	
	Type B		
	0 °C to 150 °C	1.0 °C	
	> 150 °C to 400 °C	0.40 °C	
	> 400 °C to 1 820 °C	0.25 °C	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Generating instrument** **DC resistance** 0 Ω to 100 Ω > 100 Ω to 1 MΩ > 1 MΩ to 10 MΩ > 10 MΩ to 100 MΩ	 0.17 mΩ/Ω + 0.58 mΩ 0.13 mΩ/Ω 0.48 mΩ/Ω 10 mΩ/Ω	 In-house method: CP-E3010 by direct measurement using digital ohmmeter
	DC voltage 0 mV to 100 mV > 100 mV to 1 000 mV > 1 V to 10 V > 10 V to 100 V > 100 V to 1 000 V	 0.11 mV/V + 3.5 µV 56 µV/V + 3.5 µV 48 µV/V 61 µV/V 65 µV/V	 In-house method: CP-E3001 by direct measurement using digital voltmeter
	DC current 0 µA to 500 µA > 0.5 mA to 5 mA > 5 mA to 10 mA > 10 mA to 100 mA > 100 mA to 1 000 mA > 1 A to 3 A > 3 A to 10 A	 1.5 mA/A + 0.26 µA 1.5 mA/A + 0.27 µA 0.81 mA/A 0.65 mA/A 1.3 mA/A 1.6 mA/A 3.7 mA/A	 In-house method: CP-E3004 by direct measurement using digital ammeter
	> 1 A to 3 A > 3 A to 5 A > 5 A to 55 A > 55 A to 70 A	0.50 mA/A 0.22 mA/A 0.14 mA/A 0.20 mA/A	In-house method: CP-E3004 by measure voltage across shunt, then calculate the current according to Ohm's law
	1 000 A, 2 000 A, 3 000 A 200 A to 500 A > 500 A to 3 000 A	0.50 mA/A 10 mA/A 6.0 mA/A	In-house method: CP-E3003 by measure voltage across shunt, then calculate the current according to Ohm's law
	AC voltage @ 10 Hz to 20 kHz 1 mV to 10 mV > 10 mV to 100 mV > 0.1 V to 100 V > 100 V to 200 V > 200 V to 750 V @ > 20 kHz to 50 kHz 1 mV to 10 mV > 10 mV to 100 mV > 0.1 V to 100 V > 100 V to 200 V > 200 V to 750 V @ > 50 kHz to 100 kHz 1 mV to 10 mV > 10 mV to 100 mV > 0.1 V to 100 V > 100 V to 200 V > 200 V to 750 V @ > 100 kHz to 300 kHz 1 mV to 10 mV > 10 mV to 100 mV > 0.1 V to 100 V > 100 V to 200 V	 5.5 mV/V 1.4 mV/V 1.1 mV/V 2.0 mV/V 1.1 mV/V 7.5 mV/V 2.7 mV/V 2.0 mV/V 3.6 mV/V 2.0 mV/V 17 mV/V 8.8 mV/V 8.0 mV/V 11 mV/V 8.0 mV/V 0.24 V/V 0.12 V/V 53 mV/V 69 mV/V	 In-house method: CP-E3006 by direct measurement using AC voltmeter

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Generating instrument** **AC current** @ 20 Hz to 45 Hz 50 µA to 500 µA > 0.5 mA to 400 mA @ > 45 Hz to 10 kHz 50 µA to 500 µA > 0.5 mA to 5 mA > 5 mA to 50 mA @ > 45 Hz to 1 kHz > 50 mA to 400 mA @ > 1 kHz to 10 kHz > 50 mA to 400 mA @ 10 Hz to 5 kHz > 0.1 A to 1 A > 1 A to 3 A @ > 5 kHz to 10 kHz > 0.1 A to 1 A @ 20 Hz to 45 Hz > 1 A to 10 A @ > 45 Hz to 1 kHz > 1 A to 10 A @ > 1 kHz to 10 kHz > 1 A to 10 A @ 50 Hz to 60 Hz 200 A to 3 000 A **Measuring instrument** **DC resistance** 0 Ω to < 11 Ω 11 Ω to < 33 Ω 33 Ω to < 110 Ω 110 Ω to < 330 Ω 330 Ω to < 1.1 kΩ 1.1 kΩ to < 3.3 kΩ 3.3 kΩ to < 11 kΩ 11 kΩ to < 33 kΩ 33 kΩ to < 110 kΩ 110 kΩ to < 330 kΩ 330 kΩ to < 1.1 MΩ 1.1 MΩ to < 3.3 MΩ 3.3 MΩ to < 11 MΩ 11 MΩ to < 33 MΩ 33 MΩ to < 110 MΩ 110 MΩ to < 330 MΩ 330 MΩ to 1 100 MΩ 0 Ω to 100 Ω > 100 Ω to 1 MΩ > 1 MΩ to 100 MΩ > 100 MΩ to 100 GΩ	 13 mA/A 12 mA/A 7.5 mA/A 7.2 mA/A 7.5 mA/A 7.1 mA/A 18 mA/A 1.7 mA/A 2.5 mA/A 40 mA/A 18 mA/A 10 mA/A 36 mA/A 35 mA/A 0.17 mΩ/Ω 95 µΩ/Ω 72 µΩ/Ω 44 µΩ/Ω 68 µΩ/Ω 45 µΩ/Ω 68 µΩ/Ω 44 µΩ/Ω 64 µΩ/Ω 65 µΩ/Ω 74 µΩ/Ω 92 µΩ/Ω 0.18 mΩ/Ω 0.44 mΩ/Ω 0.82 mΩ/Ω 4.0 mΩ/Ω 19 mΩ/Ω 0.13 mΩ/Ω + 2.0 mΩ 0.13 mΩ/Ω 0.36 mΩ/Ω 1.2 mΩ/Ω	In-house method: CP-E3008 by direct measurement using digital ammeter In-house method: CP-E3003 by measure voltage across shunt, then calculate the current according to Ohm's law In-house method: CP-E3011 by direct measurement against multi-function calibrator based on EURAMET cg-15 In-house method: CP-E3011 by direct measurement against decade resistance standard based on EURAMET cg-15

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Measuring instrument**		
	DC voltage		In-house method: CP-E3002 by direct measurement against multi-function calibrator based on EURAMET cg-15
	0 mV to < 330 mV	2.4 µV/V + 3.7 µV	
	330 mV to < 3.3 V	14 µV/V	
	3.3 V to < 33 V	15 µV/V	
	33 V to < 330 V	22 µV/V	
	330 V to 1 000 V	23 µV/V	
	DC current		In-house method: CP-E3005 by direct measurement against multi-function calibrator based on EURAMET cg-15
	0 µA to < 330 µA	0.18 mA/A + 24 nA	
	330 µA to < 3.3 mA	0.12 mA/A + 82 nA	
	3.3 mA to < 33 mA	0.13 mA/A	
	33 mA to < 330 mA	0.13 mA/A	
	330 mA to < 1.1 A	0.28 mA/A	
	1.1 A to < 3 A	0.46 mA/A	
	3 A to < 11 A	0.65 mA/A	
	11 A to 20.5 A	1.2 mA/A	
	AC voltage		In-house method: CP-E3007 by direct measurement against multi-function calibrator based on EURAMET cg-15
	@ 10 Hz to 45 Hz		
	1 mV to < 33 mV	0.94 mV/V + 7.5 µV	
	33 mV to < 330 mV	0.35 mV/V + 11 µV	
	0.33 V to < 3.3 V	0.37 mV/V	
	3.3 V to < 33 V	0.38 mV/V	
	@ > 45 Hz to 10 kHz		
	1 mV to < 33 mV	0.41 mV/V + 7.5 µV	
	33 mV to < 330 mV	0.41 mV/V + 11 µV	
	0.33 V to < 3.3 V	0.20 mV/V	
		0.20 mV/V	
	3.3 V to < 33 V		
	@ > 10 kHz to 20 kHz		
	1 mV to < 33 mV	0.77 mV/V + 7.5 µV	
	33 mV to < 330 mV	0.75 mV/V + 11 µV	
	0.33 V to < 3.3 V	0.25 mV/V	
	3.3 V to < 33 V	0.30 mV/V	
	@ > 20 kHz to 50 kHz		
	1 mV to < 33 mV	2.2 mV/V + 7.5 µV	
	33 mV to < 330 mV	1.9 mV/V + 11 µV	
	0.33 V to < 3.3 V	0.37 mV/V	
	3.3 V to < 33 V	0.43 mV/V	
	@ > 50 kHz to 100 kHz		
	1 mV to < 33 mV	5.5 mV/V + 15 µV	
	33 mV to < 330 mV	3.8 mV/V + 38 µV	
	0.33 V to < 3.3 V	0.87 mV/V	
	3.3 V to < 33 V	1.1 mV/V	
	@ > 100 kHz to 500 kHz		
	1 mV to < 33 mV	20 mV/V + 60 µV	
	33 mV to < 330 mV	18 mV/V + 83 µV	
	0.33 V to < 3.3 V	3.0 mV/V	
	@ 45 Hz to 1 kHz		
	33 V to < 330 V	0.23 mV/V	
	330 V to < 1 000 V	0.37 mV/V	
	@ > 1 kHz to 10 kHz		
	33 V to < 330 V	0.26 mV/V	
	@ > 1 kHz to 5 kHz		
	330 V to < 1 000 V	0.31 mV/V	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Measuring instrument** **AC voltage** @ > 5 kHz to 10 kHz 330 V to < 1 000 V @ > 10 kHz to 20 kHz 33 V to < 330 V @ > 20 kHz to 50 kHz 33 V to < 330 V @ > 50 kHz to 100 kHz 33 V to < 330 V	 0.37 mV/V 0.32 mV/V 0.38 mV/V 2.5 mV/V	In-house method: CP-E3007 by direct measurement against multi-function calibrator based on EURAMET cg-15
	AC current @ 10 Hz to 20 Hz 29 µA to < 330 µA 0.33 mA to < 3.3 mA 3.3 mA to < 33 mA 33 mA to < 330 mA @ > 20 Hz to 45 Hz 29 µA to < 330 µA 0.33 mA to < 3.3 mA 3.3 mA to < 33 mA 33 mA to < 330 mA @ 10 Hz to 45 Hz 0.33 A to < 1.1 A @ > 45 Hz to 1 kHz 29 µA to < 330 µA 0.33 mA to < 3.3 mA 3.3 mA to < 33 mA 33 mA to < 330 mA 0.33 A to < 1.1 A 1.1 A to < 3 A @ 45 Hz to 100 Hz 3 A to < 11 A 11 A to < 20 A @ > 100 Hz to 1 kHz 3 A to < 11 A 11 A to < 20 A @ > 1 kHz to 5 kHz 29 µA to < 330 µA 0.33 mA to < 3.3 mA 3.3 mA to < 33 mA 33 mA to < 330 mA 0.33 A to < 1.1 A 1.1 A to < 3 A 3 A to < 11 A 11 A to < 20 A	 2.4 mA/A + 0.12 µA 2.4 mA/A + 0.19 µA 2.1 mA/A + 2.4 µA 2.1 mA/A + 24 µA 1.8 mA/A + 0.12 µA 1.5 mA/A + 0.19 µA 1.1 mA/A + 2.4 µA 1.1 mA/A + 24 µA 2.1 mA/A + 0.13 mA 1.5 mA/A + 0.12 µA 1.2 mA/A + 0.19 µA 0.48 mA/A + 2.4 µA 0.48 mA/A + 24 µA 0.60 mA/A + 0.13 mA 0.71 mA/A + 0.13 mA 0.71 mA/A + 2.5 mA 1.4 mA/A + 6.0 mA 1.2 mA/A + 2.5 mA 1.8 mA/A + 6.0 mA 3.5 mA/A + 0.18 µA 2.4 mA/A + 0.24 µA 0.95 mA/A + 2.4 µA 1.2 mA/A + 59 µA 7.1 mA/A + 1.2 mA 7.1 mA/A + 1.2 mA 35 mA/A + 2.5 mA 35 mA/A + 6.0 mA	In-house method: CP-E3009 by direct measurement against multi-function calibrator based on EURAMET cg-15
	Frequency **Amplitude (into 50 Ω)** 50 mVp-p to 10 Vp-p 0.1 Hz to 15 MHz	 26 µHz/Hz	In-house method: CP-E3012 by direct measurement of frequency standards

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
1. Electrical (Cont.)	**Measuring instrument** **Temperature indicator** **Resistance thermometer**		EURAMET cg-1**1**
	-200 °C to -100 °C	0.029 °C
	> -100 °C to 0 °C	0.042 °C
	> 0 °C to 200 °C	0.071 °C
	> 200 °C to 400 °C	0.11 °C
	> 400 °C to 600 °C	0.14 °C
	> 600 °C to 850 °C	0.19 °C
	Thermocouple (with conjunction compensation)	
	Type B	
	600 °C to 800 °C	0.60 °C
	> 800 °C to 1 000 °C	0.45 °C
	> 1 000 °C to 1 820 °C	0.42 °C
	Type R	
	0 °C to 300 °C	0.74 °C
	> 300 °C to 1 000 °C	0.44 °C
	> 1 000 °C to 1 767 °C	0.49 °C
	Type S	
	0 °C to 300 °C	0.64 °C
	> 300 °C to 1 400 °C	0.47 °C
	> 1 400 °C to 1 767 °C	0.56 °C
	Type E	
	-250 °C to < -100 °C	0.60 °C
	-100 °C to 600 °C	0.21 °C
	> 600 °C to 1 000 °C	0.26 °C
	Type J	
	-210 °C to 0 °C	0.35 °C
		0.22 °C
	> 0 °C to 700 °C	
	> 700 °C to 1 200 °C	0.28 °C
	Type K	
	-200 °C to <-100 °C	0.41 °C
	-100 °C to 1 000 °C	0.32 °C
	> 1 000 °C to 1 372 °C	0.48 °C
	Type N	
	-200 °C to < 0 °C	0.50 °C
	0 °C to 400 °C	0.25 °C
	> 400 °C to 1 300 °C	0.33 °C
	Type T	
	-250 °C to -200 °C	0.78 °C
	> -200 °C to 0 °C	0.30 °C
	> 0 °C to 400 °C	0.21 °C

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
2. Mass	**Conventional Mass Class F1**		In-house Method CP-P1003 based on OIML-R111 by comparison method (ABBA)
	1 mg to 10 kg		
	1mg	6.0 µg	
	2 mg	6.0 µg	
	5 mg	6.0 µg	
	10 mg	8.0 µg	
	20 mg	10 µg	
	50 mg	12 µg	
	100 mg	16 µg	
	200 mg	20 µg	
	500 mg	25 µg	
	1 g	30 µg	
	2 g	40 µg	
	5 g	50 µg	
	10 g	60 µg	
	20 g	80 µg	
	50 g	0.10 mg	
	100 g	0.16 mg	
	200 g	0.30 mg	
	500 g	0.80 mg	
	1 kg	1.6 mg	
	2 kg	3.0 mg	
	5 kg	8.0 mg	
	10 kg	16 mg	
	Conventional mass		
	20 kg	60 mg	
	50 kg	8.0 g	
	1 mg to 10 mg	8.0 µg	
	> 10 mg to 20 mg	10 µg	
	> 20 mg to 50 mg	12 µg	
	> 50 mg to 100 mg	16 µg	
	> 100 mg to 200 mg	20 µg	
	> 200 mg to 500 mg	25 µg	
	> 500 mg to 1 g	30 µg	
	> 1 g to 2 g	40 µg	
	> 2 g to 5 g	50 µg	
	> 5 g to 10 g	60 µg	
	> 10 g to 20 g	80 µg	
	> 20 g to 50 g	0.10 mg	
	> 50 g to 100 g	0.16 mg	
	> 100 g to 200 g	0.40 mg	
	> 200 g to 500 g	0.80 mg	
	> 500 g to 1 kg	1.6 mg	
	> 1 kg to 2 kg	3.0 mg	
	> 2 kg to 5 kg	10 mg	
	> 5 kg to 10 kg	18 mg	
	> 10 kg to 20 kg	60 mg	
	> 20 kg to 30 kg	65 mg	
	> 30 kg to 60 kg	10 g	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
2. Mass (Cont.)	**Electronic balance and comparator balance**		In-house method: CP-P1004 based on UKAS LAB 14
	1 g to 10 g	20 µg	
	> 10 g to 40 g	60 µg	
	> 40 g to 100 g	0.20 mg	
	> 100 g to 200 g	0.30 mg	
	> 200 g to 500 g	1.0 mg	
	> 500 g to 1 kg	1.5 mg	
	> 1 kg to 3 kg	10 mg	
	> 3 kg to 30 kg	0.10 g	
	> 30 kg to 60 kg	5.0 g	
	> 60 kg to 150 kg	0.10 kg	
	> 150 kg to 250 kg	0.11 kg	
	> 250 kg to 600 kg	0.23 kg	
	> 600 kg to 2 000 kg	5.0 kg	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
3. Mechanical	**Force measuring instrument** **Compression mode** **Increasing and decreasing**		
	1 kN to 0.44 MN	0.40 mN/N	ISO 376
	1 kN to 0.44 MN	0.50 mN/N	ISO 7500-1
	8 N to 2 300 N	0.084 %	ISO 7500-1
			by comparison against standard mass
	Tension mode **Increasing and decreasing**		
	1 kN to 0.44 MN	0.40 mN/N	ISO 376
	1 kN to 0.44 MN	0.50 mN/N	ISO 7500-1
	8 N to 2 300 N	0.084 %	ISO 7500-1
			by comparison against standard mass
	Cable tensiometer		ISO 7500-1
	Tension		by comparison against
	Increasing only		standard mass
	44 N to 1 800 N	0.16 %	
	1 300 N to 8 900 N	0.60 %	ISO 7500-1
			by comparison against standard dynamometer
	Hand torque tools		ISO 6789
	Torque wrench		
	Type I (Class A, B, and C)		
	1 N·m to 5 400 N·m	5.0 mN·m/N·m	
	Type II (Class A, B, and C)		
	1 N·m to 5 400 N·m	10 mN·m/N·m	
	Torque screw driver		
	Type II (Class D, E, and F)		
	1 N·m to 10 N·m	10 mN·m/N·m	
	Pressure measuring devices		DKD R 6-1
	Absolute pressure (*Pabs*)		Pressure medium: N2, air
	1.4 kPa to 175 kPa	2.7×10^{-5} *Pabs* but not smaller than 0.70 Pa	
	> 175 kPa to 700 kPa	2.8×10^{-5} *Pabs*	
	> 700 kPa to 7 000 kPa	3.0×10^{-5} *Pabs*	
	Gauge pressure *(Pe)*		Pressure medium: N2, air
	1.4 kPa to 175 kPa	2.7×10^{-5} *Pe* but not smaller than 0.50 Pa	
	> 175 kPa to 700 kPa	2.8×10^{-5} *Pe*	
	> 700 kPa to 7 000 kPa	3.0×10^{-5} *Pe*	
	> 7 MPa to 14 MPa	1.6 kPa	
	> 14 MPa to 42 MPa	4.8 kPa	
	0.5 MPa to 40 MPa	4.9×10^{-5} *Pe* but not smaller than 0.20 kPa	Pressure medium: oil
	> 40 MPa to 139 MPa	5.8×10^{-5} *Pe*	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
3. Mechanical (Cont.)	**Pressure balance**		EURAMET cg-3 (method A)
	1.4 kPa to 175 kPa	3.8 x 10^{-5} *Pe* but not smaller than 0.66 Pa	Pressure medium: N2
	> 175 kPa to 700 kPa	3.9 x 10^{-5} *Pe*	
	> 700 kPa to 7 MPa	4.1 x 10^{-5} *Pe*	
	0.5 MPa to 40 MPa	5.3 x 10^{-5} *Pe* but not smaller than 0.21 kPa	Pressure medium: oil
	> 40 MPa to 139 MPa	5.9 x 10^{-5} *Pe*	
	Pressure measuring devices		DKD R 6-1
	Differential pressure (P*diff*)		Pressure medium: N2, air
	0 kPa to 250 kPa	12 Pa	Line pressure: ambient pressure
	> 250 kPa to 700 kPa	49 Pa	
	> 700 kPa to 7 000 kPa	0.32 kPa	
	Vacuum measuring devices		
	Absolute pressure (Pabs)		Pressure medium: N2
	0.14 Pa to 2 Pa	4.4 x 10^{-2} Pabs	
	> 2 Pa to 13 Pa	3.0 x 10^{-2} Pabs	
	> 13 Pa to 90 Pa	8.6 x 10^{-3} Pabs	
	> 90 Pa to 1.3 kPa	3.8 x 10^{-3} Pabs	
	> 1.3 kPa to 13 kPa	4.2 x 10^{-3} Pabs	
	Gauge pressure (*Pe*)		Pressure medium: N2, air
	-98 kPa to 0 kPa	10 Pa	
	Force measuring instrument		ISO 376
	Compression mode		ISO 7500-1
	Increasing and decreasing		
	1 kN to 0.44 MN	0.70 mN/N	
	Tension mode		
	Increasing and decreasing		
	1 kN to 0.44 MN	0.70 mN/N	
	Pressure measuring devices		DKD R 6-1
	Absolute pressure (Pabs)		Pressure medium: N2, air
	1.4 kPa to 135 kPa	12 Pa	
	> 135 kPa to 280 kPa	30 Pa	
	> 280 kPa to 350 kPa	67 Pa	
	> 350 kPa to 700 kPa	73 Pa	
	> 700 kPa to 2 800 kPa	0.30 kPa	
	> 2.8 MPa to 7 MPa	0.73 kPa	
	Gauge pressure *(Pe)*		Pressure medium: N2, air
	1.4 kPa to 280 kPa	30 Pa	
	> 280 kPa to 700 kPa	73 Pa	
	> 700 kPa to 2.8 MPa	0.30 kPa	
	> 2.8 MPa to 7 MPa	0.73 kPa	
	Vacuum measuring device		DKD R 6-1
	Gauge pressure (Pe)		Pressure medium: N2, air
	-98 kPa to 0 kPa	44 Pa	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
4. DIMENSION	**Gauge block (steel)**		ISO 3650 by comparison technique
	0.5 mm to 10 mm	0.060 µm	
	> 10 mm to 25 mm	0.080 µm	
	> 25 mm to 50 mm	0.11 µm	
	> 50 mm to 75 mm	0.15 µm	
	> 50 mm to 75 mm	0.19 µm	
	125 mm	0.26 µm	
	150 mm	0.27 µm	
	175 mm	0.28 µm	
	200 mm	0.30 µm	
	250 mm	0.33 µm	
	300 mm	0.37 µm	
	400 mm	0.45 µm	
	500 mm	0.53 µm	
	Plain plug gauge		EURAMET cg-6 by direct measurement of length standards
	0.5 mm to 100 mm	0.70 µm	
	Plain ring gauge, setting ring gauge (parallel) diameter		EURAMET cg-6 by direct comparison to ring gauge standards
	3 mm to 10 mm	0.80 µm	
	> 10 mm to 100 mm	1.0 µm	
	> 100 mm to 300 mm	1.5 µm	
	Master bars/setting bars (flatted ends and spherical ends)		In-house method: CP-D1011 by direct measurement (< 100 mm) and comparison technique (> 100 mm)
	1 mm to 100 mm	0.70 µm	
	> 100 mm to 500 mm	1.1 µm	
	> 500 mm to 1 500 mm	3.0 µm	
	Pin gauge		EURAMET cg-6 by direct measurement
	0.5 mm to 100 mm	0.70 µm	
	Taper gauge		In-house method: CP-D1050 based on ISO 1947 by direct measurement
	0.5 mm to 60 mm	30 µm	
	Linear thickness standard		In-house method: CP-D1041 by direct measurement and comparison technique
	0.5 mm to 1 mm	0.30 µm	
	> 1 mm to 50 mm		
	> 50 mm to 100 mm	0.50 µm	
	Snap gauge		JIS B 7420 by comparison to ring gauge standards
	3 mm to 100 mm	1.2 µm	
	> 100 mm to 300 mm	1.5 µm	
	Straight edge		In-house method: CP-D1047 Based on JIS B 7514 by comparison to straight edge standards
	100 mm to 900 mm	3.0 µm	
	Sine bar		JIS B 7523 by direct measurement of length standards
	100 mm to 200 mm	1.0 µm	
	> 200 mm to 500 mm	1.2 µm	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
4. Dimension (Cont.)	**Caliper checker**		In-house method: CP-D1002
	0 mm to 300 mm	1.0 µm	by comparison to gauge
	> 300 mm to 600 mm	1.5 µm	block standards
	Height setting micrometer and height master		ISO 7863 by comparison to gauge block standards
	0 mm to 300 mm	1.0 µm	
	> 300 mm to 600 mm	1.5 µm	
	Riser block size		ISO 7863 by comparison to
	300 mm	1.0 µm	gauge block standards
	Depth micrometer checker		ISO 7863 by comparison to
	25 mm to 100 mm	0.50 µm	gauge block standards
	> 100 mm to 300 mm	1.0 µm	
	Dial calibration tester		**JIS B 7503 by direct**
	0 mm to 1 mm	0.20 µm	measurement of laser
	0 mm to 5 mm	0.20 µm	interferometer
	0 mm to 25 mm	0.40 µm	
	Micrometer caliper for external measurement		ISO 3611
	0 mm to 25 mm	1.5 µm	
	> 25 mm to 500 mm	2.5 µm	
	Micrometer caliper for Internal measurement		JIS B 7502 and DIN 863-4
	25 mm to 50 mm	0.90 µm	
	> 50 mm to 100 mm	1.0 µm	
	> 100 mm to 400 mm	2.0 µm	
	> 400 mm to 500 mm	3.0 µm	
	Depth micrometer		JIS B 7544
	0 mm to 300 mm	1.5 µm	
	Three point internal micrometer		DIN 863-4
	3 mm to 300 mm	1.5 µm	
	Micrometer head		JIS B 7502
	0 mm to 50 mm	0.90 µm	
	Indicator comparator		JIS B 7519
	0 mm to 0.5 mm	0.20 µm	
	Vernier dial and digital caliper		ISO 3599 and ISO 6906
	0 mm to 300 mm	13 µm	
	> 300 mm to 1 000 mm	15 µm	
	Height gauge		JIS B 7517
	0 mm to 1 000 mm	15 µm	
	Depth gauge		JIS B 7518
	0 mm to 600 mm	15 µm	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
4. Dimension (Cont.)	**Dial Gauge**		
	0 mm to 25 mm	0.6 μm	ISO 463
	0 mm to 100 mm	1.5 μm	
	0 mm to 500 mm	5.0 μm	
	Dial Test Indicator		JIS B7533
	0 mm to 0.8 mm	3.5 μm	
	Protractor		In-house method CP-D1043 by comparison to angle standards (Sine Bar)
	0° to 180°	0.10°	
	Cylinder Gauge, Bore Gauge		JIS B 7515 by comparison to length standards
	6 mm to 300 mm	1.3 μm	
	Linear Measuring Device		JIS B 7450 by direct measurement of laser interferometer
	Linear Scale		
	0 mm to 100 mm	1.0 μm	
	>100 mm to 500 mm	2.0 μm	
	>500 mm to 1000 mm	3.0 μm	
	>1.0 m to 2.0 m	5.0 μm	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
5. Temperature	**Temperature Calibration Liquid Bath**		In-house Method CP-T1008 by direct measurement of Temperature Standards
	-50°C to <0°C	0.040 °C	
	0°C to 420°C	0.020 °C	
	Dry Block Calibrator		In-house Method CP-T1018 based on *EURAMET cg-13 by* Direct measurement of Temperature Standards
	-50°C to 400°C	0.060 °C	
	>400°C to 600°C	0.50 °C	
	>600°C to 1200°C	0.50 °C	
	Thermocouple Probe		ASTM E220
	Type E, J, K, N		
	0 to 300 °C	0.60 °C	
	>300 to 420 °C	0.70 °C	
	>420 to 600 °C	1.2 °C	
	>600 to 800 °C	1.5 °C	
	>800 to 1000 °C	1.9 °C	
	Type J, K, N:		
	>1000 to 1200 °C	2.2 °C	
	Type T		
	0 to 200 °C	0.36 °C	
	>200 to 300 °C	0.53 °C	
	>300 to 420 °C	0.70 °C	
	Type R, S		
	0 to 420 °C	0.32 °C	
	>420 to 600 °C	0.55 °C	
	>600 to 1200 °C	0.80 °C	
	Resistance Thermometer		ASTM 644
	-50°C to 0°C	0.040°C	
	>0°C to 420°C	0.025°C	
	Standard platinum resistance thermometer		ITS-90 with fixed point
	At triple of water 0.01 ₀C and triple point of Hg -38.8334 ₀C	5.0 mK	
	At triple of water 0.01 ₀C and melting point of Gallium 29.7646 ₀C	5.0 mK	
	At triple of water 0.01 ₀C and freezing point of tin 231.9280 ₀C	7.0 mK	
	At triple of water 0.01 ₀C and freezing point of zinc 419.5270 ₀C	8.0 mK	
	-38.834 4 ₀C to 29.764 6 ₀C	5.0 mK	
	0.01 ₀C to 29.764 6 ₀C	5.0 mK	
	0.01 ₀C to 419.527 ₀C	8.0 mK	

Field of Measurement	Parameter and Range of Measurement	Calibration Measurement Uncertainty (±)	Standard/Test Method Technique/Equipment
5. Temperature (Cont.)	**Temperature indicator with sensor**		In-house method: CP-T1005 and CP-T1011 based on ASTM E 220 by comparison
	Resistance thermometer		
	-50°C to 0 °C	0.040 °C	E220 by comparison to
	>0°C to 420°C	0.025 °C	temperature standards
	Thermocouple		
	Type R, S		
	0°C to 420 °C	0.25 °C	
	>420°C to 1200°C	0.90 °C	
	Type K, J, E, N		
	0°C to 1200 °C	2.2 °C	
	Type T		
	0°C to 400 °C	2.2 °C	
	Liquid in glass Thermometer		ASTM - E77
	Total immersion		
	-50 °C to 0 °C	0.050 °C	
	>0 °C to 50 °C	0.030 °C	
	>50 °C to 150 °C	0.040 °C	
	>150 °C to 300 °C	0.060 °C	
	>300 °C to 400 °C	0.15 °C	
	Partial immersion		
	-50 °C to 0 °C	0.10 °C	
	>0 °C to 105 °C	0.25 °C	
	>105 °C to 400 °C	0.50 °C	
	Thermo-hygrograph Temperature		In-house method CP-T1007 by direct comparison to
	10°C to 40°C	0.60 °C	Temperature standard in chamber
	Relative humidity		In-house method CP-T1007 by direct comparison to
	at temperature 23 °C		humidity standards in chamber
	35 % to 50 %	3.0 %	BSEN 7882
	> 50 % to 80 %	3.6 %	
	Thermo-hygrograph Temperature		In-house method CP-T1007 by direct comparison to
	10°C to 40°C	0.30 °C	temperature standard in chamber
	Relative humidity		In-house method CP-T1007 by direct comparison to
	at temperature 23 °C		humidity standards in chamber
	35 % to 50 %	3.0 %	BSEN 7882
	> 50 % to 80 %	3.6 %	